

**THE GOVERNMENT OF
THE HONG KONG SPECIAL ADMINISTRATIVE REGION
CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT
WEST DEVELOPMENT OFFICE**

**Contract No. YL/2020/04
Site Formation and Infrastructure Works for Public Housing Developments at
Kam Tin South, Yuen Long – Phase 1**

Proposal on Mitigation Measures and EM&A Programme

[Version 1.1]

Civil Engineering and Development Department

**Contract No. YL/2020/04
Site Formation and Infrastructure Works for
Public Housing Developments at Kam Tin
South, Yuen Long – Phase 1**

**Proposal on Mitigation Measures and
EM&A Programme**

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Certified By



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REMARKS:

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Table of Contents

	Page
1 INTRODUCTION.....	2
1.1 Background.....	2
1.2 The Proposed Works – Modification of Drainage Discharge along Kam Tin River (Section between Tung Wui Road and 500m South of Tung Wui Road)	2
2 MITIGATION MEASURES.....	3
2.1 Mitigation Measures on Water Quality Aspect.....	3
2.2 Mitigation Measures on Ecological Aspect	4
2.3 Mitigation Measures on Air quality Aspect.....	5
2.4 Mitigation Measures on Noise Aspect.....	5
2.5 Mitigation Measures on Waste Management Aspect	5
2.6 Mitigation Measures on Hazard Aspect	6
2.7 Mitigation Measures on Landscape and Visual Aspect	6
3 ENVIRONMENTAL MONITORING AND AUDIT PROGRAMME.....	7
3.1 Project Organization.....	7
3.2 Water Quality Impact.....	8
3.3 Landscape and Visual Impact.....	14
3.4 Other Impacts.....	15
3.5 Site Environmental Audit.....	15
3.6 Reporting.....	17

List of Tables

Table 1	Analytical Methods to Be Applied to Water Quality Samples
Table 2	Water Monitoring Stations
Table 3	Action and Limit Levels for water quality
Table 4	Event and Action Plan for water quality

List of Figures

Figure 1.1	Location of Proposed Modification / New Outfall
Figure 1.2	Mitigation Measures for Modification of Existing Outfalls / Construction of New Outfall
Figure 2.1	Planned Noise Sensitive Receiver
Figure 3.1	Proposed Water Monitoring Stations

1 INTRODUCTION

1.1 Background

1.1.1 As part of the infrastructural works proposed by Civil Engineering Development Department (CEDD) under Agreement No. CE 34/2014(CE) for new public housing developments at Kam Tin South (the Project), the construction of proposed drainage system under this Project will involve the construction of additional outfalls and modification of existing outfalls at Kam Tin River. An Environmental Impact Assessment (EIA) Report for Main Drainage Channels for Ngau Tam Mei, Yuen Long and Kam Tin was approved prior to implementation of EIA Ordinance, with the Environmental Permit No. FEP-01/195/2004A (the EP) currently held by DSD and CEDD for the Project. According to Clause 2.1 of the EP, the Permit Holder shall, no later than three months before the commencement of the modification works, submit for approval by the Director a detailed proposal on the mitigation measures and environmental monitoring and audit (EM&A) programme. This document is the detailed proposal on the mitigation measures and EM&A programme.

1.2 The Proposed Works – Modification of Drainage Discharge along Kam Tin River (Section between Tung Wui Road and 500m South of Tung Wui Road)

1.2.1 This Project involves the site formation works for a number of sites within Kam Tin South, which will be subject to further housing development upon the completion of this Project.

1.2.2 Due to the changes in catchment characteristics resulted from the aforesaid housing development within the sites, the stormwater runoff collected from the catchments of the sites was expected to increase upon the completion of the Project.

1.2.3 To cater for the increased stormwater runoff, proposed drainage systems will be constructed under the Project, which will convey the collected stormwater runoff from the concerned catchment of these sites to a number of additional and existing drainage outfalls along the riverbank of Kam Tin River for discharge, whereas these existing drainage outfalls will be modified under the Project for providing sufficient capacities to cater for the estimated stormwater runoff.

1.2.4 There will be 5 numbers of existing outfall to be modified and 3 additional outfalls to be constructed under this Project. The locations of the proposed modified outfalls and proposed additional outfalls are shown in **Figure 1.1**. The indicative construction sequence is shown in **Figure 1.2**.

1.2.5 The construction / modification of the outfalls is planned to be carried out at the channelised Kam Tin River in dry season (i.e., November to March).

1.2.6 The proposed works are incorporated in Contract No. YL/2020/04 and the Contract commenced on 28 June 2021 and scheduled for completion in early 2025.

2 MITIGATION MEASURES

According to the Supporting Document for Application for Variation of Environmental Permits (EP-195/2004 and FEP-01/195/2004) (Final) – (Ref. OC07-05) attached to the Variation of Environmental Permit No. VEP-537/2017 (**the Supporting Document**), regarding the water quality, ecological, air quality, noise, waste management, hazard as well as landscape and visual aspects, sensitive receivers and potential impact are identified in the Supporting Document. This section is to propose mitigation measures for every aspect and the purpose of this section is to assess the effectiveness of the mitigation measures recommended by the Contractor and to identify any further need for additional mitigation measures or remedial action.

2.1 Mitigation Measures on Water Quality Aspect

2.1.1 General

2.1.1.1. Control of potential water quality impact arising from the works shall be achieved based on the following principles:

- Minimisation of runoff;
- Prevention or minimisation of the likelihood of the identified pollutants being in contact with rain or runoff or inland water bodies; and
- Measures to abate pollutants at source.

2.1.1.2. The Contractor shall apply for a discharge licence under the WPCO and the discharge shall comply with the terms and conditions of the licence. The Contractor shall also devise an Emergency Contingency Plan for control of polluted runoff during inclement weather and accidental leakage or spillage of chemicals during construction phase. It should detail the communication line between Contractor, relevant government and stakeholders, remediation plan for containing and cleaning of leakage, evaluation and improvement work and determine follow-up action, such as monitoring.

2.1.1.3. General water pollution control measures were also incorporated into the contract specification of Contract No. YL/2020/04.

2.1.2 Outfall Construction / Modification Works

2.1.2.1. The construction method and sequence of the proposed outfall construction / modification works are described in **Figure 1.2**. All construction / modification works should be conducted in dry season, by phases where necessary, in order to avoid the obstruction to the river water flow. They should also be carefully designed so that all the construction works would be undertaken within a dry zone and physically separated from Kam Tin River.

2.1.2.2. Double layers comprising of concrete bund and impermeable sheet pile walls should be installed to fully enclose the construction work areas for outfall construction / modification in / near the Kam Tin River prior to any construction works take place. Dewatering of the construction works area or diversion of water flow should be undertaken before the construction works to avoid water flow in the construction work areas. Silt removal facilities should be used to clarify the effluent generated from the dewatering operation, if any, before discharging back to the watercourse / drainage system.

2.1.2.3. The Best Management Practices detailed in **Section 2.1.3** should be followed as closely as practicable to further minimise water quality impacts of construction works and surface run-off.

2.1.3 Site Run-off and General Activities

2.1.3.1. The Best Management Practices (BMPs) given in the ProPECC PN 1/94 shall be implemented in controlling water pollution during the whole construction phase. The main practices provided in the ProPECC PN 1/94 are also summarized below which should be implemented by the contractor during the construction phase, where practicable:

- High loading of SS in site runoff should be prevented through proper site management by the contractor;
- Sand and silt removal facilities, channels and manholes should be maintained and the deposited silt and grit should be removed regularly by the contractor, and at the onset of and after each rainstorm to ensure that these facilities are functioning properly;
- The drilling operation can be fully controlled by the workers, the volume of sediment laden water and the material stockpiled in the temporary storage steel tank can be anticipated such that spillage can be prevented. The tank should be kept within the temporary working platform with surrounding concrete bund walls. The tanks should be removed to other site area located far away from the river immediately after filling up and within the same day;
- Stockpiles should not be kept in the river and should be located away from the river;
- Plant workshop/ maintenance areas should be bundled on a hard standing. Sediment traps and oil interceptors should be provided at appropriate locations;
- Works should be programmed to minimize soil excavation works where practicable during the rainy days;
- Vehicle wheel washing facilities should be provided at the site exit such that mud, debris, etc. attached to the vehicle wheels or body can be washed off before the vehicle leaves the work site;
- Section of the road between the wheel washing bay and the public road will be paved to reduce vehicle tracking of soil and to prevent site run-off from entering public road drains; and
- Sufficient chemical toilets should be provided in the works areas for the sewage generated by the workforce. A licensed waste collector should be deployed to clean the chemical toilets on a regular basis. Any sewage or wastewater discharge into the surrounding environment should not be allowed. Any chemical toilets should be located away from the riverside to prevent spillage of sewage.

2.2 Mitigation Measures on Ecological Aspect

- 2.2.1 Use of quieter powered mechanical plant can limit noise emissions at source. The implementation of good site practices (restrict works within works boundary, general dust suppression measures and good house-keeping) can further reduce the potential ecological impacts into acceptable level.
- 2.2.2 For the proposed outfall works, the water flow of Kam Tin River would not be affected during the construction phase. Good site practices, similar to those mentioned in the sections above would be implemented to minimize potential noise and water quality impacts. In order to control the potential leakage, sand bags and pumping well would be used to prevent runoff from entering the river. No unacceptable ecological impacts are anticipated.
- 2.2.3 The proposed sewer works to be undertaken within Kam Tin River would involve trenchless construction method and therefore no habitat loss is anticipated and there would not be any effects on the hydrology of the river. Due to health and safety issues, the avoidance of the dry season months is unfeasible (as the water flow within the river would be high during wet season) and thus works must take place during the two dry seasons.
- 2.2.4 During the construction phase, the works boundaries would also be regularly inspected to avoid the leakage of polluted water into Kam Tin River.

2.3 Mitigation Measures on Air quality Aspect

- 2.3.1 Dust control and suppression measures stipulated in the Air Pollution Control (Construction Dust) Regulation will be implemented to control the dust emissions from the site including regular water spraying of exposed surfaces, wheel washing and covering dusty material stockpiles with tarpaulin sheet and provision of covers for all trucks would minimize dust emissions.
- 2.3.2 General air pollution control measures were also incorporated into the contract specification of Contract No. YL/2020/04.

2.4 Mitigation Measures on Noise Aspect

- 2.4.1 A review of nearby noise sensitive receiver (NSR) was conducted. When compared with those identified in the Supporting Document of the VEP prepared in 2017, a new planned NSR is identified at the delta surrounded by Kam Po Road, Tin Wui Road and Kam Wui Road. It is a temporary transitional housing development of at most 4 storeys. The population intake is tentatively planned in the third quarter of 2023¹, which will overlap with part of the construction period of this Project. According to the development layout in the planning application document (Application No.: A/YL-KTS/899), the nearest residential unit is about 77m away from the proposed modification of an existing outfall (**Figure 2.1**). With reference to the Supporting Document of the VEP, some existing NSRs (village houses in Shek Wu Tong) are even closer to the construction site of a new outfall and the Document concluded that no noise exceedance or violation of the environmental performance in the approved EIA Report. Therefore, given the small scale of work and works area, the noise impact on this new planned NSR should be well mitigated through implementation of standard noise control measures as listed below.
- 2.4.2 General noise control measures were incorporated into the contract specification of Contract No. YL/2020/04 to control construction noise impacts. The following on-site measures should also be implemented:
- Use of noise enclosures where applicable;
 - Reduction in the number of noisy plant operating simultaneously;
 - Maintenance of noisy equipment so as to minimise noise;
 - Siting mobile plant as far away from NSRs as possible;
 - Turning off noisy plant when not in use; and
 - Effective use of material stock piles and other structures for noise screening on-site.

2.5 Mitigation Measures on Waste Management Aspect

- 2.5.1 Good waste management plan and practices shall be implemented to ensure proper handling and disposal of waste to ensure that construction wastes do not enter the nearby streams or drainage channel. Inert C&D materials would be generated in the proposed works, including alluvial sand and stiff & slightly clayey sandy silt material, moderately strong TUFF soil, and rock. These inert C&D materials would be reused on site as backfilling materials. Non-inert C&D materials mainly plywood for formwork would be sorted on-site before disposal to the WENT Landfill site at Tuen Mun. Disposal of C&D materials should be managed in accordance with the Development Bureau *Technical Circular (Works) DEVB TC(W) No. 6/2010 "Trip Ticket System for Disposal of Construction & Demolition Materials"*.

¹ Transport and Housing Bureau. 2022. *LC Paper No. CB(1)319/2022(05) Legislative Council Panel on Housing. Annual Work Report on the Funding Scheme to Support Transitional Housing Projects by Non-government Organisations and Implementation Progress.*

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- 2.5.2 All chemical wastes from equipment maintenance will be handled, stored, and disposed of properly in accordance with the Waste Disposal (Chemical Waste) Regulation.
 - 2.5.3 General refuse will be stored in enclosed bins or compaction units, separated from C&D materials and chemical wastes. A reputable waste collector should be employed by the contractor to collect and dispose of general refuse, which will be separated from C&D materials and chemical wastes, on a daily or every second day basis to minimize odour, pest and litter impacts.
 - 2.5.4 General waste management measures were incorporated into the contract specification of Contract No. YL/2020/04.

2.6 Mitigation Measures on Hazard Aspect

- 2.6.1 According to the Supporting Document, since the impact of risk due to the proposed works is anticipated to be negligible, no mitigation measure at the Site is required.

2.7 Mitigation Measures on Landscape and Visual Aspect

- 2.7.1 Landscape and visual mitigation measures proposed for the construction phase to alleviate potential adverse impact shall be reinstatement of all landscape areas disturbed temporarily during working period on like-to-like basis or for better quality.

3 ENVIRONMENTAL MONITORING AND AUDIT PROGRAMME

3.1 Project Organization

3.1.1 The responsibilities of the Contractor, Environmental Team (ET), Independent Environmental Checker (IEC), *Project Manager* (PM) or *Project Manager's Delegates* (PMD) parties are as below:

3.1.2 The Contractor

- Provide assistance to ET in carrying out monitoring and auditing;
- Submit proposals on mitigation measures in case of exceedances of Action and Limit levels in accordance with the Event and Action Plans;
- Implement measures to reduce impact where Action and Limit levels are exceeded; and
- Adhere to the agreed procedures for carrying out compliant investigation.

3.1.3 Environmental Team

- Set up all the required environmental monitoring stations;
- Monitor various environmental parameters as required in the EM&A Programme for the proposed works;
- Analyse the environmental monitoring and audit data and review the success of EM&A programme to cost-effectively confirm the adequacy of mitigation measures implemented and the validity of the predictions in the Supporting Document and to identify any adverse environmental impacts arising;
- Carry out site inspection to investigate and audit the Contractors' site practice, equipment and work methodologies with respect to pollution control and environmental mitigation for the proposed works, and take proactive actions to pre-empt problems;
- Audit and prepare audit reports on the environmental monitoring data and site environmental conditions;
- Report on the environmental monitoring and audit results to the IEC, Contractor, the PM/PMD and EPD or its delegated representative;
- Recommend suitable mitigation measures to the Contractor in the case of exceedance of Action and Limit levels in accordance with the Event and Action Plans;
- Undertake regular on-site audits / inspections on the proposed works and report to the Contractor and the PM/PMD of any potential non-compliance;
- Follow up and close out non-compliance actions;
- Adhere to the procedures for carrying out environmental complaint investigation;
- Prepare baseline monitoring report, monthly EM&A report and final EM&A review report.

3.1.4 Independent Environmental Checker

- Review the EM&A works performed by the ET and reports prepared by ET;
- Audit the site works, and monitoring activities and results (at not less than bi-weekly intervals);
- Report the audit results to the PM/PMD and EPD in parallel;

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- Review the EM&A reports submitted by the ET;
 - Review the proposal on mitigation measures submitted by the Contractor in accordance with the Event and Action Plans;
 - Scrutinize the mitigation measures submitted by the Contractor in accordance with the Event and Action Plans;
 - Scrutinize the mitigation measures that have been recommended in this proposal, and ensure they are properly implemented in a timely manner, when necessary; and
 - Report the findings of site inspections and other environmental performance reviews to PM/PMD and EPD.

3.1.5 Project Manager or Project Manager's Delegates

- Supervise the Contractor's activities and ensure that the requirements in the EM&A Programme are fully complied with;
- Inform the Contractor when action is required to reduce impacts in accordance with the Event and Action Plans;
- Employ an ET to undertake monitoring, laboratory analysis and reporting of environmental monitoring and audit;
- Employ an IEC to audit the results of the EM&A works carried out by the ET; and
- Comply with the agreed Event Contingency Plan in the event of any exceedance.

Sufficient and suitably qualified professional and technical staff shall be employed by the respective parties to ensure full compliance with their duties and responsibilities, as required under the EM&A programme for the duration of the Project.

The ET Leader shall have at least 7 years of experience in conducting EM&A for infrastructure projects. And the IEC should possess at least 7 years of experience in EM&A.

3.2 Water Quality Impact

3.2.1 Introduction

3.2.1.1. According to the Supporting Document, the water quality impact associated with the proposed works could be controlled by adopting the recommended mitigation measures. The key water quality impacts caused by the proposed works would be associated with the provision of additional outfalls and modification of existing outfalls along Kam Tin River as described in Section 2.1.2. To ensure no adverse water quality impact to the Kam Tin River due to the construction activities of the proposed works, water quality monitoring is recommended to be carried out during the construction phase. This section describes the requirement of water quality monitoring during construction phase.

3.2.2 Water Quality Parameters

3.2.2.1. Dissolved oxygen (DO), temperature, salinity, turbidity, suspended solids (SS) level, pH and zinc should be monitored at designated water quality monitoring stations.

3.2.2.2. Replicate in-situ measurements and samples collected from each independent sampling event should be carried out to ensure a robust statistically interpretable dataset. The levels of DO, temperature, salinity, turbidity and pH should be measured in-situ whereas SS level and zinc should be determined by laboratory analysis.

3.2.3 **Field Log**

3.2.3.1. Other relevant data should also recorded, such as: monitoring location / position, time, water depth, weather conditions and any special phenomena underway near the monitoring station.

3.2.4 **Monitoring Equipment**

Dissolved Oxygen and Temperature Measuring Equipment

3.2.4.1. The instrument should be a portable and weatherproof DO measuring instrument complete with cable and sensor, and use a DC power source. The equipment should be capable of measuring:

- a DO level in the range of 0 – 20 mg/L and 0 – 200% saturation; and
- a temperature of 0 – 45 degree Celsius.

Salinity Measurement Instrument

3.2.4.2. A portable salinometer capable of measuring salinity in the range 0 – 40 parts per thousand (ppt) should be provided for measuring salinity of the water at each designated monitoring station.

Turbidity Measurement Instrument

3.2.4.3. The instrument should be a portable and weatherproof turbidity-measuring instrument using a DC power source. It should have a photoelectric sensor capable of measuring turbidity between 0 – 1000 NTU (for example, Hach model 2100P or an approved similar instrument).

pH Measurement Instrument

3.2.4.4. The instrument should consist of a potentiometer, a glass electrode, a reference electrode and a temperature-compensating device. It should be readable to 0.1 pH in a range of 0 to 14. Standard buffer solutions of at least pH 7 and pH 10 should be used for calibration of the instrument before and after use.

Positioning Device

3.2.4.5. The locations of water monitoring stations should be located using a hand-held Global Positioning System (GPS) or other equivalent instrument of similar accuracy. This is to ensure that the water sampling locations are accurate and consistent before taking measurements.

Sampler

3.2.4.6. A water sampler is required. It should comprise a transparent PVC cylinder, with a capacity of not less than 2 litres, which can be effectively sealed with latex cups at both ends. The sampler should have a positive latching system to keep it open and prevent premature closure until released by a messenger when the sampler is at the selected water depth (for example, Kahlsico Water Sampler or an approved similar instrument).

Water Depth Detector

3.2.4.7. A portable, battery-operated echo sounder would be used for the determination of water depth at each designated monitoring station. If echo sounder is not applicable due to low water depth, various sized stainless steel rules would be used to determine the water depth.

Sample Containers and Storage

- 3.2.4.8. Water samples for SS and zinc should be stored in high density polythene bottles with no preservative added, packed in ice (cooled to 4°C without being frozen) and delivered to the laboratory and analysed as soon as possible after collection. Sufficient volume of samples should be collected to achieve the detection limit stated in **Table 1**.

Calibration of In-situ Instruments

- 3.2.4.9. The pH meter, DO meter and turbidimeter should be checked and calibrated before use. They should be certified by a laboratory accredited under HOKLAS or any other international accreditation scheme, and subsequently re-calibrated at three monthly intervals throughout all stages of the water quality monitoring. Responses of sensors and electrodes should be checked with certified standard solutions before each use. Wet bulb calibration for a DO meter should be carried out before measurement at each monitoring location.
- 3.2.4.10. Sufficient stocks of spare parts should be maintained for replacements when necessary. Backup monitoring equipment should also be made available so that monitoring can proceed uninterrupted even when some equipment is under maintenance, calibration, etc.

3.2.5 Laboratory Measurement / Analysis

- 3.2.5.1. Analysis of suspended solids (SS) and zinc should be carried out in a HOKLAS or other international accredited laboratory. Sufficient water samples should be collected at the monitoring stations for carrying out the laboratory determinations. The determination work should start within 24 hours after collection of the water samples. The analyses should follow the American Public Health Association (APHA) Standard Methods for the Examination of Water and Wastewater or an equivalent method subject to the approval of EPD. Analytical methods and detection limits for SS are present in **Table 1**.

Table 1 Analytical Methods to be applied to Water Quality Samples

Parameters	Analytical Method	Detection Limit
Suspended Solids	APHA 2540D *	0.5 mg/L
Zinc	APHA 3111B*	10 µg/L

* APHA American Public Health Association Standard Methods for the Examination of Water and Wastewater.

- 3.2.5.2. The testing of SS and zinc should be HOKLAS accredited (or if not, approved by EPD) and comprehensive quality assurance and control procedures in place in order to ensure quality and consistency in results. The Quality Assurance / Quality Control (QA/QC) (such as blank, spike recovery, etc.) should be in accordance with the requirements of HOKLAS or international accredited scheme. The QA/QC results should be reported.

3.2.6 Monitoring Stations

- 3.2.6.1. Water quality monitoring is proposed in the Kam Tin River. One monitoring station should be set in the upstream of the proposed works area as a control station, and one impact monitoring station should be set in the downstream of the proposed works area. The locations of the monitoring stations are shown in **Figure 3.1**, which are chosen as they are at reasonable distance from the works area and accessible via DSD maintenance ramps.

Table 2 Water Monitoring Stations

Stations	Location	Coordinates	
WMS1	Upstream Control Station	825049	832188
WMS2	Downstream Impact Station	824727	832922

- 3.2.6.2. Sampling should be taken at three water depths, namely, 1 m below water surface, mid-depth and 1 m above river bed. If the sampling water depth is less than 6 m, the mid-depth may be omitted. For water depth that is less than 3 m, only the mid-depth station will be monitored.

3.2.7 Baseline Monitoring

- 3.2.7.1. Baseline conditions in the Kam Tin River should be established and agreed with EPD prior to the commencement of the proposed works. The purpose of the baseline monitoring is to establish ambient conditions prior to the commencement of the proposed works and to demonstrate the suitability of the proposed monitoring stations. The baseline conditions should normally be established by measuring the water quality parameters specified in **Section 3.2.2**.
- 3.2.7.2. The baseline monitoring should be taken at all designated monitoring stations in the Kam Tin River, three (3) days per week, for at least four (4) weeks prior to the commencement of construction works. There should not be any construction activities in the vicinity of the stations during the baseline monitoring. The interval between two sets of monitoring should not be less than 36 hours.
- 3.2.7.3. Baseline monitoring schedule should be submitted to EPD at least one (1) weeks prior to the commencement of baseline monitoring. EPD should be notified immediately for any changes in schedule.
- 3.2.7.4. The baseline monitoring report should be submitted to EPD for agreement at least one (1) weeks before the commencement of the construction works. The baseline monitoring report should be certified by the IEC before submission to EPD.

3.2.8 Impact Monitoring

- 3.2.8.1. During the construction phase of the proposed works (excluding the in-between wet season period), impact monitoring should be undertaken at all designated monitoring stations three (3) days per week with sampling/measurement at the designated monitoring stations in the Kam Tin River. Upon completion of the construction phase of the proposed works, the monitoring exercise at the designated monitoring stations should be continued for four weeks in the same manner as the impact monitoring. The interval between two sets of monitoring should not be less than 36 hours except where there are exceedances of Action and/or Limit Levels, in which case the monitoring frequency will be increased.
- 3.2.8.2. The water quality monitoring schedule should be submitted to EPD at least one (1) week before the first day of each monitoring month. EPD should be notified immediately of any changes in schedule. If the monitoring data collected at the designated stations indicate that the Action or Limit Levels as shown in **Table 3** are exceeded, appropriate actions should be taken in accordance with the Event and Action Plan in **Table 4**.

3.2.9 Action and Limit Levels

- 3.2.9.1. The water quality criteria, namely action and limit levels, are shown in **Table 3**. These criteria should be applied to ensure that any deterioration of water quality is readily detected and timely action is taken to rectify the situation.

Table 3 Action and Limit Levels for Water Quality

Parameters	Action Level	Limit Level
DO in mg/L	<u>Surface, middle, bottom DO</u> ≤ 5 %-ile of baseline data	<u>Surface, middle DO</u> ≤ 4 mg/L and 1%-ile of baseline data for surface and middle layer <u>Bottom DO</u> ≤ 2 mg/L and 1%-ile of baseline data for bottom layer
SS in mg/L	<u>Depth-average SS</u> ≥ 95 %-ile of baseline data or 120% of upstream control station.	<u>Depth-average SS</u> ≥ 99 %-ile of baseline data or 130% of upstream control station.

Parameters	Action Level	Limit Level
Turbidity in NTU	<u>Depth-average SS</u> ≥ 95 %-ile of baseline data or 120% of upstream control station.	<u>Depth-average SS</u> ≥ 99 %-ile of baseline data or 130% of upstream control station.
Zinc in mg/L	>120% of upstream control station	>130% of upstream control station
pH	N/A	<6.5 or >8.5

Notes:

- (1) For DO, non-compliance of the water quality limits occurs when monitoring result is lower than the limits.
- (2) For SS and turbidity, non-compliance of the water quality limits occurs when monitoring result is higher than the limits.

3.2.10 Event and Action Plan

3.2.10.1. Should the monitoring results of the water quality parameters at any designated impact monitoring station exceed the water quality criteria, the actions in accordance with the Event and Action Plan summarised in **Table 4** should be carried out.

3.2.10.2. The ET Leader should assess the potential impacts on the water sensitive receivers based on the monitoring data. The performance of the environmental management system (i.e. of the overall EM&A programme) should be reviewed by the ET Leader on a quarterly basis. The findings of this review should be included in the quarterly EM&A summary reports, together with any recommendations to improve the performance of the EM&A programme.

Table 4 Event and Action Plan for Water Quality

Event	ET Leader	IEC	PM/PMD	Contractor
Action level being exceeded by one sampling day	<ul style="list-style-type: none"> • Repeat <i>in-situ</i> measurement to confirm findings; • Identify source(s) of impact; • Inform IEC and Contractor; • Check monitoring data, all plant, equipment and Contractor's working methods; • Discuss mitigation measures with IEC and Contractor; • Repeat measurement on next day of exceedance. 	<ul style="list-style-type: none"> • Discuss with ET and Contractor on the mitigation measures; • Review proposals on mitigation measures submitted by Contractor and advise the PM/PMD accordingly; • Assess the effectiveness of the implemented mitigation measures. 	<ul style="list-style-type: none"> • Discuss with IEC on the proposed mitigation measures; • Make agreement on the mitigation measures to be implemented; 	<ul style="list-style-type: none"> • Inform the PM/PMD and confirm notification of the non-compliance in writing; • Rectify unacceptable practice; • Check all plant and equipment; • Consider changes of working methods; • Discuss with ET and IEC and propose mitigation measures to IEC and PM/PMD; • Implement the agreed mitigation measures.

Proposal on Mitigation Measures and EM&A Programme

Event	ET Leader	IEC	PM/PMD	Contractor
Action level being exceeded by more than one consecutive sampling days	<ul style="list-style-type: none"> Repeat <i>in-situ</i> measurement to confirm findings; Identify source(s) of impact; Inform IEC and Contractor; Check monitoring data, all plant, equipment and Contractor's working methods; Discuss mitigation measures with IEC and Contractor; Ensure mitigation measures are implemented; Prepare to increase the monitoring frequency to daily; Repeat measurement on next day of exceedance. 	<ul style="list-style-type: none"> Discuss with ET and Contractor on the mitigation measures; Review proposals on mitigation measures submitted by Contractor and advise the PM/PMD accordingly; Assess the effectiveness of the implemented mitigation measures. 	<ul style="list-style-type: none"> Discuss with IEC on the proposed mitigation measures; Make agreement on the mitigation measures to be implemented; Assess the effectiveness of the implemented mitigation measures. 	<ul style="list-style-type: none"> Inform the PM/PMD and confirm notification of the non-compliance in writing; Rectify unacceptable practice; Check all plant and equipment; Consider changes of working methods; Discuss with ET and IEC and propose mitigation measures to IEC and PM/PMD within 3 working days; Implement the agreed mitigation measures.
Limit level being exceeded by one sampling day	<ul style="list-style-type: none"> Repeat <i>in-situ</i> measurement to confirm findings; Identify source(s) of impact; Inform IEC, contractor and EPD; Check monitoring data, all plant, equipment and Contractor's working methods; Discuss mitigation measures with IEC, PM/PMD and Contractor; Ensure mitigation measures are implemented; Increase the monitoring frequency to daily until no exceedance of Limit level. 	<ul style="list-style-type: none"> Discuss with ET and Contractor on the mitigation measures; Review proposals on mitigation measures submitted by Contractor and advise the PM/PMD accordingly; Assess the effectiveness of the implemented mitigation measures. 	<ul style="list-style-type: none"> Discuss with IEC, ET and Contractor on the proposed mitigation measures; Request Contractor to critically review the working methods; Make agreement on the mitigation measures to be implemented; Assess the effectiveness of the implemented mitigation measures. 	<ul style="list-style-type: none"> Inform the PM/PMD and confirm notification of the non-compliance in writing; Rectify unacceptable practice; Check all plant and equipment; Consider changes of working methods; Discuss with ET, IEC and PM/PMD and propose mitigation measures to IEC and PM/PMD within 3 working days; Implement the agreed mitigation measures.

Event	ET Leader	IEC	PM/PMD	Contractor
Limit level being exceeded by more than one consecutive sampling days	<ul style="list-style-type: none"> Repeat <i>in-situ</i> measurement to confirm findings; Identify source(s) of impact; Inform IEC, contractor and EPD; Check monitoring data, all plant, equipment and Contractor's working methods; Discuss mitigation measures with IEC, PM/PMD and Contractor; Ensure mitigation measures are implemented; Increase the monitoring frequency to daily until no exceedance of Limit level for two consecutive days. 	<ul style="list-style-type: none"> Discuss with ET and Contractor on the mitigation measures; Review proposals on mitigation measures submitted by Contractor and advise the PM/PMD accordingly; Assess the effectiveness of the implemented mitigation measures. 	<ul style="list-style-type: none"> Discuss with IEC, ET and Contractor on the proposed mitigation measures; Request Contractor to critically review the working methods; Make agreement on the mitigation measures to be implemented; Assess the effectiveness of the implemented mitigation measures; Consider and instruct, if necessary, the Contractor to slow down or to stop all or part of the marine work until no exceedance of Limit level. 	<ul style="list-style-type: none"> Inform the PM/PMD and confirm notification of the non-compliance in writing; Rectify unacceptable practice; Check all plant and equipment; Consider changes of working methods; Discuss with ET, IEC and PM/PMD and propose mitigation measures and PM/PMD within 3 working days; Implement the agreed mitigation measures; As directed by the PM/PMD, to slow down or to stop all or part of the marine work or construction activities.

3.2.11 Mitigation Measures

3.2.11.1. Mitigation measures for water quality aspect have been recommended in **Section 2.1** and the Supporting Document. The Contractor should be responsible for the design and implementation of these measures.

3.2.11.2. In the event of complaints, non-compliance or area of improvement being observed, the ET and the Contractor should review the effectiveness of these mitigation measures, design alternative or additional mitigation measures as appropriate and propose to the IEC for approval for implementation of such alternative or additional measures.

3.3 Landscape and Visual Impact

3.3.1 Introduction

3.3.1.1. According to **Section 2.7** and the Supporting Document, the landscape and visual impacts associated with the proposed works could be controlled by implementing the recommended mitigation measures. The key landscape and visual impacts caused by the proposed works would be associated with the upgrading works of the existing drainage system discharging to Kam Tin River. To monitor the landscape and visual quality impact to the Kam Tin River during the construction of the proposed works, photographic recording is recommended, and the ET is responsible for carrying out the recording works.

3.3.2 Monitoring Stations

- 3.3.2.1. The monitoring stations, which are the location for photo-taking, shall be agreed with PM/PMD before commencement of monitoring works.

3.3.3 Baseline Monitoring

- 3.3.3.1. The purpose of the baseline monitoring is to take photographic records of existing site conditions as baseline condition.

- 3.3.3.2. The baseline monitoring should be carried out at all designated monitoring stations one (1) days per week, for at least two (2) weeks prior to the commencement of construction of the proposed works. There should not be any construction activities at the location of the proposed works. The interval between two (2) sets of monitoring should not be less than three (3) days.

- 3.3.3.3. Baseline monitoring schedule should be submitted to PM/PMD at least one (1) weeks prior to the commencement of baseline monitoring. PM/PMD should be notified immediately for any changes in schedule.

- 3.3.3.4. The baseline monitoring should be recorded in the baseline monitoring report which should be submitted to PM/PMD. The baseline monitoring report should be certified by the Independent Environmental Checker (IEC) before submission to PM/PMD.

3.3.4 Impact Monitoring

- 3.3.4.1. Impact monitoring should be carried out at all designated monitoring stations one (1) day per week at the designated monitoring stations during the construction phase of the proposed works in dry season, and at least once per month during the in-between wet season. Upon completion of the construction phase, the monitoring exercise at the designated monitoring stations should be continued for two (2) weeks in the same manner as the impact monitoring. The interval between two (2) sets of monitoring should not be less than three (3) days.

- 3.3.4.2. The monitoring records should be recorded in the Monthly EM&A Report.

3.3.5 Quality and Format of Monitoring

- 3.3.5.1. The quality and format of photo-taking records shall be agreed with PM/PMD and IEC.

3.4 Other Impacts

- 3.4.1.1. Referring to the Supporting Document for Application for Variation of Environmental Permits (EP-195/2004 and FEP-01/195/2004) (Final) – (Ref. OC07-05), regarding the ecological, air quality, noise, waste management as well as hazard aspect, with the implementation of appropriate mitigation measures as stated in the **Section 2** and the Supporting Document, no adverse impact is anticipated. Therefore, other than monitoring for water quality aspect as well as landscape and visual aspect, no monitoring is proposed to these aspects.

3.5 Site Environmental Audit

3.5.1 Site Inspection

- 3.5.1.1. Site inspection provides a direct means to initiate and enforce specified environmental protection and pollution control measures. These shall be undertaken routinely to inspect construction activities for the proposed works in order to ensure that appropriate environmental protection and pollution control mitigation measures are properly implemented. Site inspection is one of the most effective tools to enforce the environmental protection requirements at the works area.

- 3.5.1.2. The ET shall be responsible for formulating the environmental site inspection programme as well as the deficiency and action reporting system, and for carrying out the site inspections. The proposal for rectification, if any, should be prepared and submitted to the ET Leader and IEC by the Contractor.
- 3.5.1.3. Regular site inspections shall be carried out and led by the PM/PMD and attended by the Contractor and ET at least once per week during the construction phase of the proposed works in dry season, and at least once per month during the in-between wet season. The areas of inspection shall not be limited to the environmental situation, pollution control and mitigation measures within the site. It should also review the environmental situations outside the works area which is likely to be affected, directly or indirectly. The ET shall make reference to the following information in conducting the inspection. During the inspection, the following information should be referred to:
- (a) The mitigation measures mentioned in this proposal;
 - (b) works progress and programme;
 - (c) individual works methodology proposals;
 - (d) contract specifications on environmental protection;
 - (e) relevant environmental protection and pollution control legislations; and
 - (f) previous site inspection results.
- 3.5.1.4. The Contractor shall keep the PM/PMD and ET Leader updated with all relevant environmental related information on the construction contract necessary for him to carry out the site inspections. Site inspection results and associated recommendations for improvements to the environmental protection and pollution control efforts should be recorded and followed up by the Contractor in an agreed time-frame. The Contractor shall follow the procedures and time-frame as stipulated in the environmental site inspection, and the deficiency and action reporting system formulated by the ET, to report on any remedial measures subsequent to the site inspections.
- 3.5.1.5. The PM/PMD, ET and the Contractor should also carry out ad-hoc site inspections if significant environmental problems are identified. Inspections may also be required subsequent to receipt of a valid environmental complaint, or as part of the investigation work, as specified in the Event and Action Plan for the EM&A programme.
- 3.5.2 Compliance with Legal and Contractual Requirements**
- 3.5.2.1. There are statutory requirements on environmental protection and pollution control requirements with which construction of the proposed works must comply.
- 3.5.2.2. In order to ensure the works comply with corresponding requirements, all method statements of the proposed works should be submitted by the Contractor to the PM/PMD for approval and to the ET Leader to ensure sufficient environmental protection and pollution control measures have been included. Any proposed changes to the mitigation measures shall be certified by the ET Leader and verified by the IEC as conforming to the relevant information and recommendations contained in this proposal.
- 3.5.2.3. The PM/PMD and ET shall also review the progress and programme of the proposed works to check that relevant environmental legislations have not been violated, and that any foreseeable potential for violating laws can be prevented.
- 3.5.2.4. The Contractor should provide the update of the relevant documents of the proposed works to the ET Leader so that checking can be carried out. The document shall at least include the updated Works Progress Reports, updated Works Programme, method statements, any application letters for different licences / permits under the environmental protection laws, and copies of all valid licences / permits. The site diary and environmental records shall also be available for inspection by the relevant parties.

- 3.5.2.5. After reviewing the document, the ET shall advise the IEC and Contractor of any non-compliance with legislative requirements on environmental protection and pollution control so that they can timely take follow-up actions as appropriate. If the follow-up actions may still result in potential violation of environmental protection and pollution control requirements, the PM/PMD and ET should provide further advice to the Contractor to take remedial action to resolve the problem.
- 3.5.2.6. Upon receipt of the advice, the Contractor shall undertake immediate actions to correct the situation. The PM/PMD and ET shall follow up to ensure that appropriate action has been taken in order to satisfy legal requirements.

3.5.3 Environment Complaints

- 3.5.3.1. The following procedures should be undertaken upon receipt of any environmental complaint relating to the proposed works:
- (a) The Contractor to log complaint and date of receipt onto the complaint database and inform the PM/PMD, ET and IEC immediately;
 - (b) The Contractor to investigate, with the PM/PMD and ET, the complaint to determine its validity, and assess whether the source of the problem is due to construction works of the proposed works with the support of additional monitoring frequency and stations, if necessary;
 - (c) The Contractor to identify remedial measures in consultation with the IEC, ET and PM/PMD if a complaint is valid and due to the construction works of the proposed works;
 - (d) The Contractor to implement the remedial measures as required by the PM/PMD and to agree with the ET and IEC any additional monitoring frequency and stations, where necessary, for checking the effectiveness of the remedial measures;
 - (e) The PM/PMD, ET and IEC to review the effectiveness of the Contractor's remedial measures and the updated situation;
 - (f) The ET to undertake additional monitoring and audit to verify the situation if necessary, and oversee that circumstances leading to the complaint do not recur;
 - (g) If the complaint is referred by the EPD, the Contractor to prepare interim report on the status of the complaint investigation and follow-up actions stipulated above, including the details of the remedial measures and additional monitoring identified or already taken, for submission to EPD within the time frame assigned by the EPD; and
 - (h) The ET to record the details of the complaint, results of the investigation, subsequent actions taken to address the complaint and updated situation including the effectiveness of the remedial measures, supported by regular and additional monitoring results in the monthly EM&A reports.

3.6 Reporting

3.6.1 General

- 3.6.1.1. Reports can be provided in an electronic medium upon agreeing the format with the PM/PMD and EPD. This would enable a transition from a paper / historic and reactive approach to an electronic / real time proactive approach. All the monitoring data (baseline and impact) shall also be submitted on diskettes or other approved media.
- 3.6.1.2. Types of reports that the ET shall prepare and submit include baseline monitoring report, monthly EM&A report and final EM&A review report. In accordance with Annex 21 of the EIAO-TM, a copy of the monthly and final review EM&A reports shall be made available to the Director of Environmental Protection.

3.6.2 **Baseline Monitoring Report**

3.6.2.1. The baseline monitoring report shall include at least the following:

- (a) up to half a page executive summary;
- (b) brief project background information;
- (c) drawings showing locations of the baseline monitoring stations;
- (d) monitoring results (in both hard and diskette copies) together with the following information:
 - monitoring methodology;
 - name of laboratory and types of equipment used and calibration details;
 - parameters monitored;
 - monitoring locations;
 - monitoring date, time, frequency and duration; and
 - quality assurance (QA) / quality control (QC) results and detection limits;
- (e) details of influencing factors, including:
 - major activities, if any, being carried out on the site during the period;
 - weather conditions during the period; and
 - other factors which might affect monitoring results;
- (f) determination of the Action and Limit Levels for each monitoring parameter and statistical analysis of the baseline data;
- (g) revisions for inclusion in the EM&A Programme; and
- (h) comments, recommendations and conclusions.

3.6.3 **Monthly EM&A Reports**

- 3.6.3.1. The results and findings of all EM&A work required in the EM&A Programme shall be recorded in the monthly EM&A reports prepared by the ET and endorsed by the IEC. The EM&A report shall be prepared and submitted to EPD within 10 working days of the end of each reporting month, with the first report due the month after construction of the proposed works commences. Copies of each monthly EM&A report shall be submitted to the following parties: the IEC, the PM/PMD and EPD. Before submission of the first EM&A report, the ET shall liaise with the parties on the required number of copies and format of the monthly reports in both hard copy and electronic medium.
- 3.6.3.2. The ET should prepare and submit a Baseline Environmental Monitoring Report at least one week before commencement of construction of the proposed works. Copies of the Baseline Environmental Monitoring Report should be submitted to the IEC, PM/PMD and EPD. The ET should liaise with the relevant parties on the exact number of copies require.
- 3.6.3.3. The ET shall review the number and location of monitoring stations and parameters every six months, or on as needed basis, in order to cater for any changes in the surrounding environment and the nature of works in progress.

3.6.3.4. The monthly EM&A report shall include at least the following:

- (a) Executive Summary (1-2 pages):
 - breaches of Action and Limit levels;
 - compliant log
 - notifications of any summons and successful prosecutions;
 - reporting changes; and
 - future key issues.
- (b) Basic project information:
 - project organization including key personnel contact names and telephone numbers;
 - programme;
 - management structure; and
 - works undertaken during the month.
- (c) Environmental status:
 - advice on the status of statutory environmental compliance such as the status of compliance with the environmental permit (EP) conditions under the EIA Ordinance, submission status under the EP and implementation status of mitigation measures;
 - works undertaken during the month with illustrations (such as location of works, daily excavation rate, etc.); and
 - drawings showing the project are, any environmental sensitive receivers and the locations of the monitoring and control stations (with co-ordinates of the monitoring locations).
- (d) A brief summary of EM&A requirements including:
 - all monitoring parameters;
 - environmental quality performance limits (Action and Limit levels);
 - Event-Action Plans;
 - environmental mitigation measures, as recommended in this proposal; and
 - environmental requirements in contract documents.
- (e) Implementation status
 - advice on the implementation status of environmental protection and pollution control / mitigation measures, as recommended in the EM&A.
- (f) Monitoring results (in both hard and diskette copies) together with the following information:
 - monitoring methodology;
 - name of laboratory and types of equipment used and calibration details;
 - parameters monitored;

- monitoring locations;
 - monitoring date, time, frequency and duration;
 - weather conditions during the period;
 - any other factors which might affect the monitoring results; and
 - QA/QC results and detection limits.
- (g) Report on non-compliance, complaints, and notifications of summons and successful prosecutions:
- record of all non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
 - record of all complaints received (written or verbal) for each media, including locations and nature of complaints investigation, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary;
 - record of all notification of summons and successful prosecutions for breaches of current environmental protection / pollution control legislation, including locations and nature of the breaches, investigation, follow-up actions taken, results and summary;
 - review of the reasons for and the implications of non-compliances, complaints, summons and prosecutions including review of pollution sources and working procedures; and
 - description of the actions taken in the event of non-compliance and deficiency reporting and any follow-up procedures related to earlier non-compliance.
- (h) Others
- an account of the future key issues as reviewed from the works programme and work method statements;
 - record of any project changes from the originally proposed as described in this proposal (e.g. construction methods, mitigation proposals, design changes, etc.); and
 - comments (for examples, effectiveness and efficiency of the mitigation measures), recommendations (for examples, any improvement in the EM&A programme) and conclusions.
- (i) Appendices
- Action and Limit levels;
 - graphical plots of trends of the monitoring parameters at key stations over the past four reporting periods for representative monitoring stations annotated against the following:
 - (i) major activities being carried out on site during the period;
 - (ii) weather conditions during the period; and
 - (iii) any other factors that might affect the monitoring results.

- monitoring schedule for the present and next reporting period;
- cumulative statistics on complaints, notifications of summons and successful prosecutions; and
- outstanding issues and deficiencies.

3.6.4 Final EM&A Review Reports

3.6.4.1. The EM&A programme for construction stage should be terminated upon the completion of the construction activities of the proposed works. The proposed termination should only be implemented after the proposal has been endorsed by the IEC and the PM followed by approval from the Director of Environmental Protection.

3.6.4.2. The final EM&A review report for construction stage (to be submitted after completion of construction activities of the proposed works) should contain at least the following information:

- (a) Executive summary (1-2 pages):
- (b) Drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations;
- (c) Basic project information including a synopsis of the project organization, contacts of key management, and a synopsis of work undertaken during the course of the proposed works;
- (d) A brief summary of EM&A requirements including:
 - environmental mitigation measures for construction stage, as recommended in this proposal;
 - environmental impact hypotheses tested;
 - environmental quality performance limits (Action and Limit levels);
 - all monitoring parameters;
 - Event and Action Plans;
- (e) A summary of the implementation status of environmental protection and pollution control / mitigation measures for construction stage, as recommended in this proposal and summarized in the updated implementation schedule;
- (f) Graphical plots and the statistical analysis of the trends of monitoring parameters over the course of the project, including:
 - major activities being carried out on site during the period;
 - weather conditions during the period; and
 - any other factors that might affect the monitoring results.
- (g) A summary of non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
- (h) A review of the reasons for and the implications of non-compliance including review of pollution sources and working procedures as appropriate;
- (i) A description of the actions taken in the event of non-compliance;
- (j) A summary record of all complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up actions taken and results;

-
- (k) A review of the validity of predictions of EM&A programme for construction stage and identification of shortcomings in recommendations of the EM&A programme;
 - (l) Comments (for example, a review of the effectiveness and efficiency of the mitigation measures and of the performance of the environmental management system, that is, of the overall EM&A programme for construction stage); and
 - (m) Recommendations and conclusions (for example, a review of success of the overall EM&A programme for construction stage to cost-effectively identify deterioration and to initiate prompt effective mitigation action when necessary).
 - project organization including key personnel contact names and telephone numbers;
 - programme;

3.6.5 Data Keeping

- 3.6.5.1. No site-based documents (such as monitoring field records, laboratory analysis records, site inspection forms, etc.) are required to be included in the monthly EM&A reports. However, any such document shall be well kept by the ET and be ready for inspection upon request. All relevant information shall be clearly and systematically recorded in the document. Monitoring data shall also be recorded in magnetic media form, and the software copy must be available upon request. Data format shall be agreed with EPD. All documents and data shall be kept for at least one year following completion of the construction contract.

3.6.6 Interim Notifications of Environmental Quality Limit Exceedances

- 3.6.6.1. With reference to the Event and Action Plans, when the environmental quality performance limits are exceeded and if they are proven to be valid, the ET should immediately notify the IEC and EPD, as appropriate. The notification should be followed up with advice to the IEC and EPD on the results of the investigation, proposed actions and success of the actions taken, with any necessary follow-up proposals.

FIGURES

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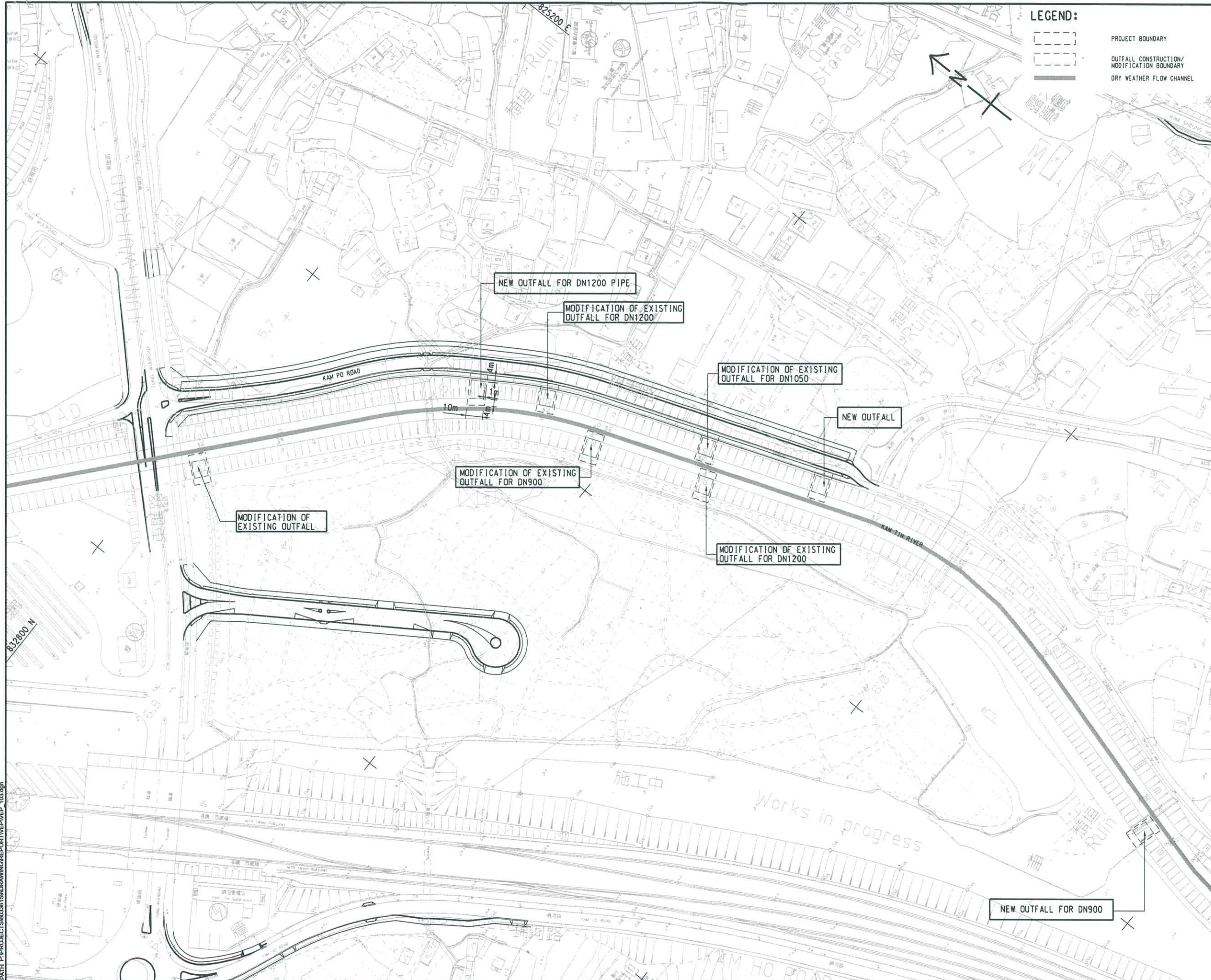
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Checked:

Designer:

Project Management Initials:

Plot File by: chenmk
2017/02/25
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LEGEND:

- PROJECT BOUNDARY
- OUTFALL CONSTRUCTION/MODIFICATION BOUNDARY
- DRY WEATHER FLOW CHANNEL

AECOM

PROJECT
項目
VEP OF EP195/2004

CLIENT
業主
CEDD 土木工程拓展署
Civil Engineering and Development Department

CONSULTANT
工程顧問公司
AECOM Asia Company Ltd.
www.aecom.com

SUB-CONSULTANTS
分判工程顧問公司

ISSUE/REVISION
發行

I/R 發行	DATE 日期	DESCRIPTION 內容摘要	CHK. 核對

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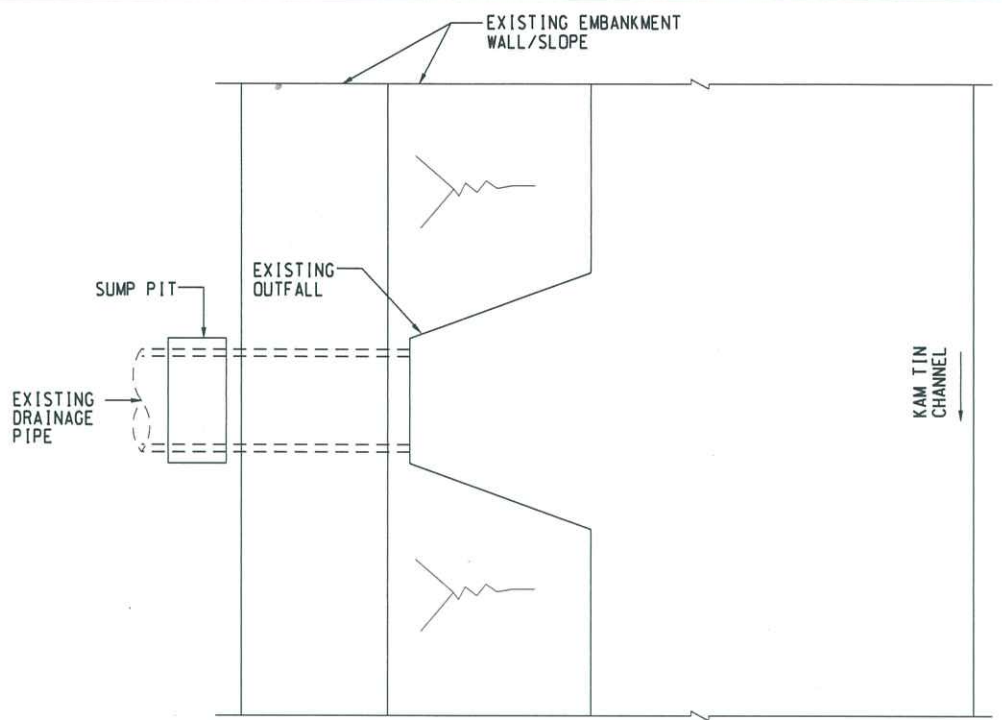
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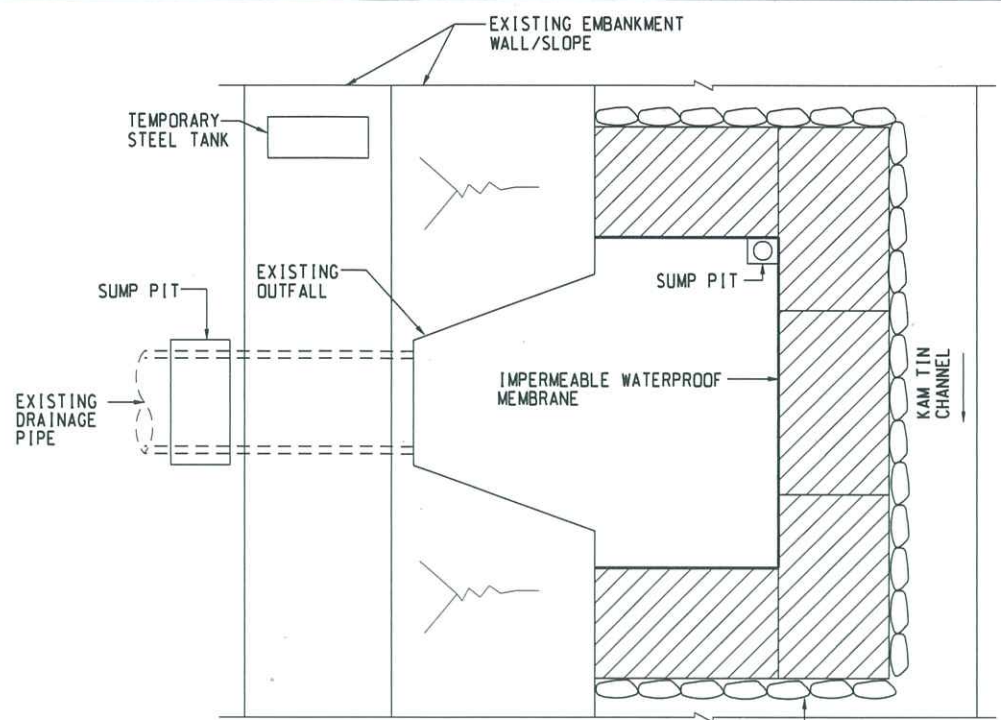
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FIGURE 1.1

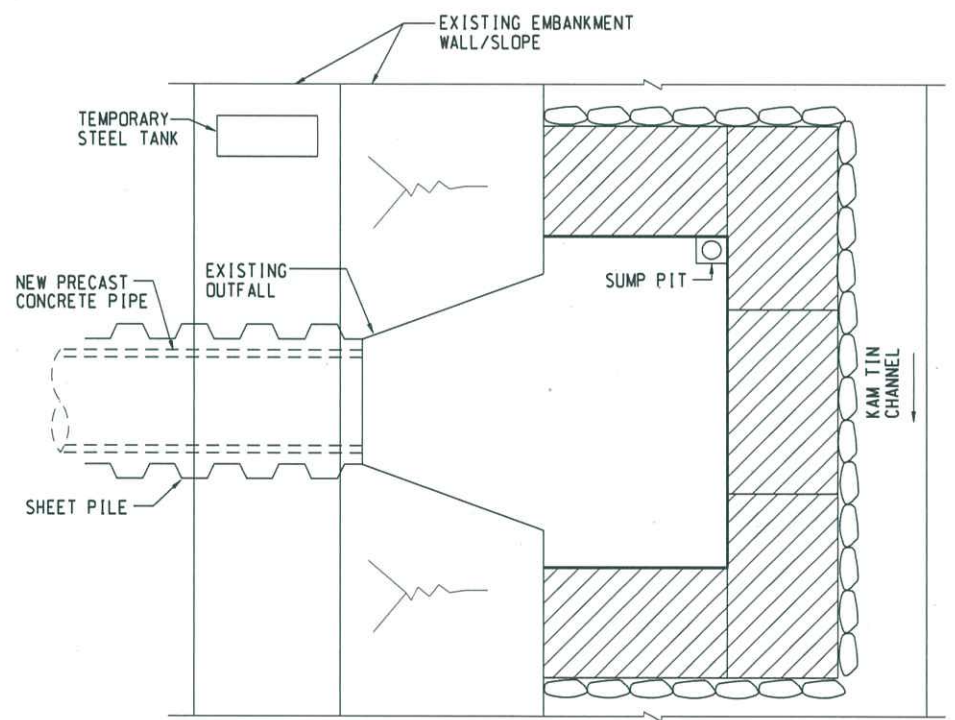
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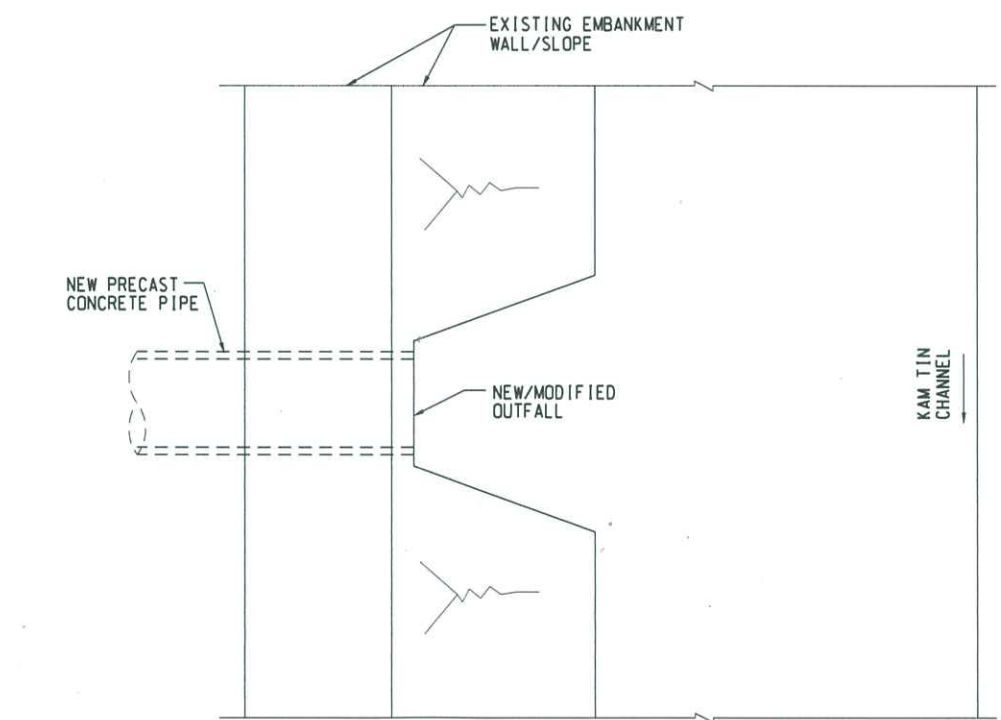
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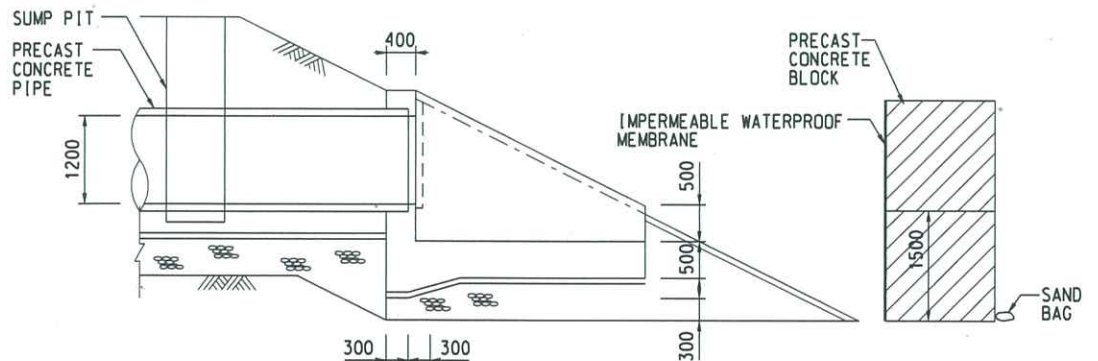
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STAGE 3 & 4
 SCALE 1 : 50



STAGE 5 & 6
 SCALE 1 : 50



SECTION A - A
 SCALE 1 : 50

NOTE:

1. DETAILS OF THE WATER QUALITY MITIGATION MEASURES ARE DISCUSSED IN SECTION 1.2.3.3 OF THE SUPPORTING DOCUMENTS

STAGE:

- CONSTRUCT A SUMP PIT TO CONFINE EXISTING FLOW AND BYPASS TO KAM TIN RIVER LAY TEMPORARY DRAINAGE SYSTEM ALONG RIVER EMBANKMENT IF NECESSARY.
- FORM A COFFERDAM AROUND THE WORKS AREA ON KAM TIN CHANNEL BY PLACING PRECAST CONCRETE BLOCKS AND SAND BAGS AGAINST RAINFALL.
- REMOVE EXISTING EMBANKMENT WALL AND EXCAVATE THE EXISTING OUTFALL DRAIN TO FORMATION LEVEL.
- PLACE GEOTEXTILE AND LEVEL STONE AT THE LOCATION TO LAY THE NEW OUTFALL DRAIN REPLACE THE EXISTING OUTFALL DRAIN WITH NEW PRECAST CONCRETE PIPE. (OR LAG NEW PRECAST CONCRETE PIPE FOR NEW OUTFALL)
- INSTALL CUT PIPE INSIDE OUTFALL AND INSTALL FLAP VALVE PATCH UP EXISTING OUTFALL OR CAST-IN-SITU THE NEW OUTFALL.
- REMOVE PRECAST CONCRETE BLOCKS REINSTATE RIVER CHANNEL AND RIVER EMBANKMENT.

ISSUE/REVISION
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NO.	DATE	DESCRIPTION	CHK.

I/R	DATE	DESCRIPTION	CHK.

STATUS
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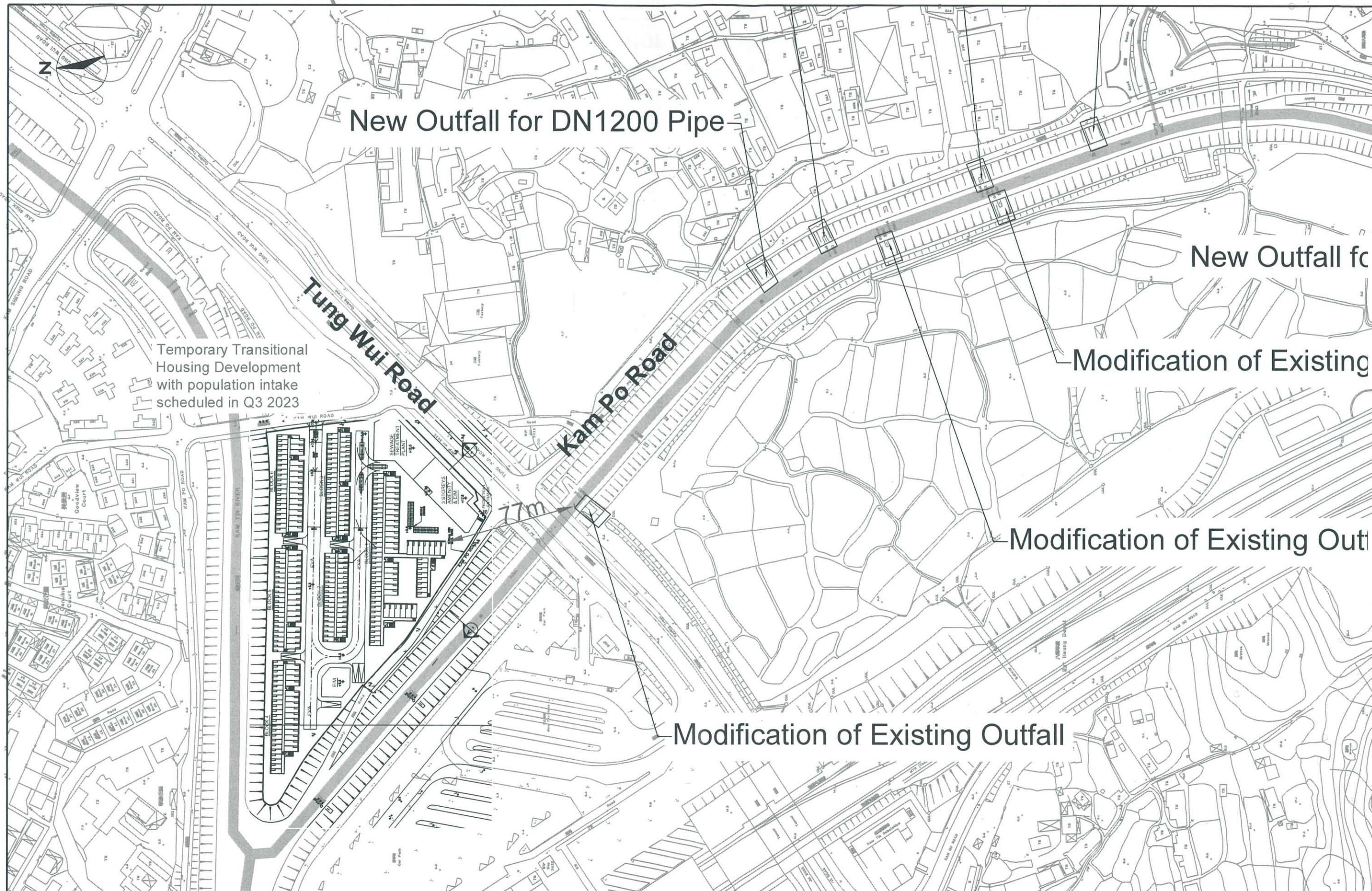
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PROJECT NO.	CONTRACT NO.
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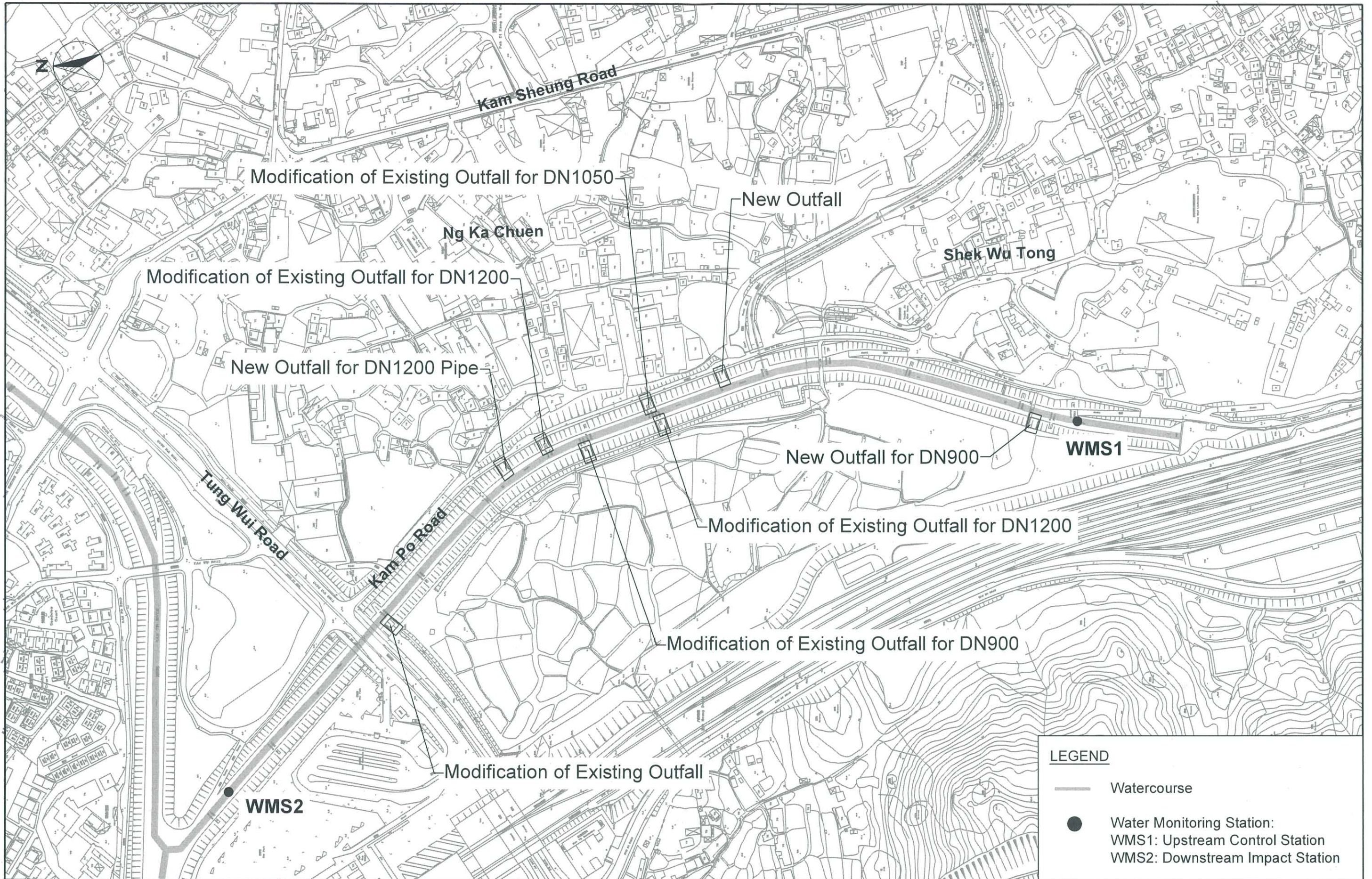
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MITIGATION MEASURES FOR MODIFICATION OF EXISTING OUTFALLS / CONSTRUCTION OF NEW OUTFALLS

SHEET NUMBER
 圖紙號碼
FIGURE 1.2

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JOB No.	MA22199	DRAWING No.	2.1
		REV	-



Proposed Water Monitoring Stations

LEGEND			
	Watercourse		
	Water Monitoring Station:		
	WMS1: Upstream Control Station		
	WMS2: Downstream Impact Station		
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JOB No.	MA22199	DRAWING No.	3.1
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